A PRELIMINARY STUDY OF THE FOOD OF THE CLUPEID ILISHA AFRICANA (BLOCH) OCCURRING IN THE COASTAL WATERS OF CAPE COAST (GHANA)

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ABSTRACT

Ilisha africana which occurs in the coastal waters of Cape Coast was found to be partly carnivorous and partly planktivorous feeding mainly on fish and shrimp and during upwelling, on zooplankton especially Hyperia sp and Temora sp. The composition and frequency of occurrence of the stomach contents varied from month to month. Between August and September, 1985, the stomach contents were predominantly zooplankton.

Keywords: Ilisha africana, carnivorous, zooplankton, upwelling, stomach content, percentage composition

INTRODUCTION

According to Windell and Bowen [1], much of the current understanding of the autecology, production and ecological role of fish populations is derived from studies of the diet based on analysis of stomach contents.

Ilisha africana is one of the clupeid fishes of economic importance in many coastal towns in Ghana, it is available throughout the year [2].

In this paper, the stomach contents of I. africana were examined and analysed to determine the nature of the food and the monthly variation in the amount of food consumed.

MATERIALS AND METHOD

Monthly samples of I. africana were purchased from fishermen at Duakor near the University of Cape Coast, Ghana, between the period April, 1985 and March, 1986. The stomachs were analysed for their stomach contents. The stomach and its contents were preserved in 70% alcohol prior to analysis. The contents were emptied into a petri-dish containing 1-2 mls of water and observed with the unaided eye, then by the hand lens and finally under the microscope under varying magnifications.

Two methods, the method of percentage composition by number and the frequency of occurrence method were applied in the analysis of the stomach contents [1] which were identified using manuals by Newell and Newell [3] and Wickstead [4].

(i) Method of percentage composition by number

Each particular type of stomach content was counted by tallying. All were added up to obtain a total. In the case of the zooplankton, the numbers were obtained from the relation

$$N = \frac{\pi R^2}{\pi r^2} \times A$$

where N, is the total number of organisms.
R, the internal radius of the petri-dish
r, radius of view of the eye piece of the microscope
and A, the average number of organisms per field of view.

To obtain N, the petri-dish was agitated to evenly distribute the organisms. The organisms were viewed at ten (10) different points and the number of organisms noted in each case. The average number of organisms per view, A, was calculated and applied in the above equation.

(ii) Method of frequency of occurrence

The number of stomach samples containing each type of food item was noted. The number is expressed as a percentage of all non-empty stomachs. This figure estimates the proportion of the

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CONCLUSION

For most of the phenols, R_F values on tin (IV) oxide, antimonic(V) acid and silica gel G are almost of the same order, i.e., the same separations can be achieved on tin(IV) oxide, antimonic (V) acid or on silica gel G. Therefore tin(IV) oxide and antimonic (V) acid can be good substitutes for silica gel G for the separation of phenols.

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population that feeds on that particular food item and is referred to as the frequency of occurrence.

RESULTS

The following stomach contents were observed:-

(i) **Fish larvae**

Fish larvae were not found in the stomachs in April, July and August, 1985 and February, 1986. They constituted 48.7 - 84.2% of the stomach contents and the frequency of occurrence ranged between 50.0 - 100% in most of the months in which they occurred.

(ii) **Fish fingerlings**

Both the percentage composition and the frequency of occurrence of fish fingerlings varied from month to month. No fingerlings were recorded in May, June, August, September and October, 1985 and February, 1986.

(iii) **Fish bones**

Fish bones constituted 34.6% of the stomach contents in April, 1985. The frequency of occurrence was also high (50%) in that month but varied as low as 8.3% in November, 1985 to as high as 90% in January 1986. No fish bones were recorded in October and December, 1985.

(iv) **Fish scales**

Fish scales were recorded throughout the period of study and they constituted between 20.0 - 88.7% of the stomach contents in August, 1985. The frequency of occurrence was also generally high ranging between 30.0 - 87.5% in most months with the highest value (87.5%) in March, 1986. Both the frequency of occurrence and the percentage composition varied greatly during the period of study.

(v) **Copepods**

Two different types of copepods were identified; namely Temora sp and Paracalanus sp. They appeared for the first time in September, 1985. Temora sp constituted only 7.8% of all stomach contents but occurred in 55.6% of the sample in that month. Both the percentage composition and the frequency of occurrence reduced drastically to 2.2% and 16.7% respectively in October, 1985.

Paracalanus sp occurred only in September 1985 constituting a very low proportion (0.4%) of the samples and was low in both percentage composition (0.1%) and frequency of occurrence (22.2%).

(vi) **Amphipods**

Hyperia sp and Synopia sp were identified. They also occurred between August and October, 1985. Hyperia sp. was very abundant in September, 1985 (67.1%) and was found in 88.9% of the samples. Synopia sp which occurred in September, 1985 was low in both percentage composition and frequency of occurrence (22.2%)

(vii) **Cladocerans, Mysids and Euphausid**

These occurred only in September, 1985 and constituted a low proportion of the stomach contents (0.02% each) and a low frequency of occurrence (5.6% each).

(viii) **Young squids**

Squids were recorded only in December, 1985 and they constituted a very low proportion (1.7%) of the stomach contents and a low frequency of occurrence (12.5%).

(ix) **Other zooplankton**

Other zooplankton were also observed in September, 1985 but they could not be identified to their respective species levels.

(x) **Young shrimps**

Young shrimps were observed in most months to varying degrees and they constituted as high as 43.4% of the stomach contents in November, 1985. The corresponding frequency of occurrence was 83.3%.

(xi) **Shrimp antennae fragments**

Fragments of shrimp antennae were recorded throughout the period of study except December, 1985, constituting 0.1% to 73.3% of the stomach contents between the period July and September, 1985. The frequency of occurrence also varied from 16.6% in April, 1985 to 83.3% in February, 1986.

(xii) **Other arthropod remains (legs etc)**

Assorted arthropod remains were recorded from September to November, 1985 and from January to March, 1986. They constituted between 1.1 - 10.9% of the stomach contents and occurred in between 8.3 - 44.4% of the samples.

(xiii) **Sand particles**

Sand particles were found in the stomachs throughout the period of study (except in October, 1985) constituting a very high proportion of the stomach contents in most months. The frequency of occurrence of the sand particles ranged between 8.3 - 91.7% of the samples in the various months.

(xiv) Unidentified materials

Unidentified materials were recorded in few months and constituted a low proportion of the stomach contents but occurred in 50% of the samples in September, 1985.

Table 1 summarizes the composition and frequency of occurrence of the stomach contents of 127 specimens of the clupeid, Ilisha africana landed at Duakor beach between the period April, 1985 and March, 1986

TABLE 1
Summary of stomach contents of 127 specimens of Ilisha africana landed at Duakor beach (April, 1985 - March, 1986)

Stomach Content	Percentage Composition by number		Frequency Method	
	No.	%	No. of stomachs containing each food type (x)	X expressed as % of total No. of stomachs with food
Fish larvae	521	6.8	45	35.4
Fish Fingerlings	27	0.35	7	5.51
Fish bones	64	0.84	34	26.77
Fish Scales	344	4.50	52	40.94
Temora sp	494	6.46	12	9.45
Paracalanus sp	27	0.35	4	3.15
Hyperia sp	4268	55.78	20	15.75
Synonia sp	5	0.07	4	3.15
Cladoceran	1	0.01	1	0.79
Mysid	1	0.01	1	0.79
Euphausid	1	0.01	1	0.79
Squid	3	0.04	1	0.79
Other zooplankton	622	8.58	8	6.30
Young shrimp	105	1.37	21	16.54
Shrimp antennae fragment	219	2.86	48	37.80
Other arthropod remains	920	12.02	20	15.75
Sand particles	many	-	41	32.28
Unidentified materials	few	-	23	18.11

Number of stomachs analysed : 148
Number of stomachs with food : 127
Number of empty stomachs : 21

TABLE
Table 1: Summary of stomach contents of 127 specimens of Ilisha africana landed at Duakor beach (April, 1985 - March, 1986)

The table shows that in terms of percentage composition by number, the most important items (those ranging from 4% and above) were Hyperia sp, fish larvae, fish scales, other zooplankton and other arthropod remains. In terms of the frequency of occurrence, the most important items (those which ranged between 20.0 -41.0.%) were fish bones, fish scales, shrimp antennae fragments, sand particles and fish larvae. It is also evident from the table that the stomach contents were mainly fish and shrimps. Although the zooplankton Hyperia sp was found to constitute a very high proportion of the stomach contents, it occurred during a restricted period.

DISCUSSION/CONCLUSION

The different stomach contents of Ilisha africana occurred to varying degrees in the various months during the period of study. Fish and shrimp remains generally constituted high proportions of the stomach contents in most months. The zooplankton (Temora sp; Hyperia sp etc) occurred in the stomachs between July and October, 1985 and were particularly abundant in September, 1985, especially Temora sp and Hyperia sp.

The absence of fish fry and fingerlings in the stomach samples in some months, particularly between July and October could mean that I. africana had preference for the zooplankton which were in abundance during those months.

These findings suggest that I. africana landed with beach seine at the Duakor beach are partly carnivorous and partly planktivorous, feeding mainly on fish, shrimps and zooplankton particularly Hyperia sp and Temora sp.

The occurrence of the zooplankton between July and October, 1985 coincided with the upwelling season, a period of low surface water temperatures (below 25°C) and high salinities (above 34%) [5,6]. It is also during this period that the copepod Calanoides carinatus abounds, hence the occurrence of plenty Sardinella aurita (round sardine) [5].

These suggest that generally zooplankton abound during the upwelling season and serve as food for clupeid fishes. The zooplankton Paracalanus sp and Hyperia sp have also been recorded as food for the marine forms of the clupeid Ethmalosa fimbriata in the coastal waters of Cape Coast between the period February, 1986 and March, 1977 [7].

The presence of sand grains in the stomach of the fish suggests that the fish also browsed on benthic deposits or that the sand grains entered the stomach in the fish's attempt to capture its prey.

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